

less than a given threshold and the foot presence sensors detects a foot at both platforms.

**[0039]** In a related determination, auto-balancing may be disabled if the absence of a foot is sensed, and/or if that absence is sensed for a predefined period of time.

**[0040]** In yet another embodiment, control circuit **60** may be configured to turn on auto-balancing when a foot is detected at both foot platforms, regardless of lateral tilt angle. This presence may be indicated by the weight of a rider on the platforms or by a detection of the side of the rider's foot electromagnetically or by other methods.

#### Dismount

**[0041]** Control circuit **60** may be configured to disable auto-balance when the lateral tilt angle has exceeded a threshold angle. An angle greater than this threshold may suggest that a user has fallen off and is trying to remount, or that the device has crashed and is at an odd angle. The threshold angle for disabling can be the "same" as that for enabling ("same" here may mean 10 or less for enabling and greater than 10 for disabling), or the threshold angles for disabling and enabling may be different, for example, enabling at 10 degrees and disabling at 12 degrees, i.e., once the rider is on the device, the angle for disabling is expanded over that for mounting ease.

**[0042]** While the invention has been described in connection with specific embodiments thereof, it will be understood that it is capable of further modification, and this application is intended to cover any variations, uses, or adaptations of the invention following, in general, the principles of the invention and including such departures from the present disclosure as come within known or customary practice in the art to which the invention pertains and as may be applied to the essential features hereinbefore set forth, and as fall within the scope of the invention and the limits of the appended claims.

1. An auto-balancing transportation device, comprising:
  - a wheel structure defining a longitudinally-disposed central vertical plane, when in an upright position;
  - a first foot platform provided on one lateral side of the wheel structure and a second foot platform provided on the other lateral side of the wheel structure;
  - a fore-aft pitch sensor;
  - a lateral tilt sensor;
  - a motor that drives the wheel structure;
  - a control circuit coupled to the fore-aft pitch sensor, the lateral tilt sensor and the motor, that signals the motor

to drive the wheel structure towards auto-balancing the device in response to data from the fore-aft pitch sensor;

wherein the control circuit is configured such that auto-balancing is not enabled until the lateral tilt angle from the central vertical plane is less than a given threshold angle.

2. The device of claim 1, wherein the threshold angle for enabling auto-balancing is 10 degrees or less.

3. The device of claim 1, wherein the threshold angle for enabling auto-balancing is 5 degrees or less.

4. The device of claim 1, wherein the control circuit is configured such that the initial reference pitch angle for auto-balancing is set at the pitch angle of the device when auto-balancing is enabled.

5. The device of claim 4, wherein the control circuit is configured to shift the reference pitch angle for auto-balancing from the initial reference pitch angle to the neutral pitch angle.

6. The device of claim 1, wherein the control circuit is configured to set an initial reference pitch angle that is other than the neutral pitch angle.

7. The device of claim 1, wherein the control circuit is configured to disable auto-balancing when the lateral tilt angle exceeds a threshold angle.

8. The device of claim 7, wherein the control circuit is configured to detect the occurrence of rapid, alternating lateral movement of the device and allow auto-balancing at a lateral tilt that exceeds the threshold angle for disabling auto-balancing when such an occurrence is detected.

9. The device of claim 1, further comprising a first foot presence sensor associated with the first foot platform, and a second foot presence sensor associated with the second foot platform; and

wherein the control logic is coupled to the first and second foot presence sensors and is configured to enable auto-balancing when a foot is sensed at both foot platforms.

10. The device of claim 1, including a tire arrangement at the wheel structure, the tire arrangement having a lateral cross sectional width that is 2 times or more height at that width.

11. The device of claim 1, wherein the control circuit is configured to detect the occurrence of device spin and disable auto-balancing when such an occurrence is detected.

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